SUPPORTING FRAME FOR AUTOMOBILE SUNROOF

DESCRIPTION

The invention relates to a supporting frame for automobile sunroofs, in which frame run sliding elements meant to open or close said sunroofs when actuated by the corresponding mechanism.

Currently, practically all sunroof actuation mechanisms are driven by a push-pull cable.

There exist variations of the push-pull cable, in which the element that transmits the motion can be different, such as a toothed element with racks, toothed belts, etc. and others such as worm gears.

With respect to the frame that supports the mechanisms and provides an attachment to the vehicle body, there are currently several manufacturing solutions.

In some systems the lateral guides are made by extrusion separately from the front piece, which is made by injection. The guides are metallic and are machined later and attached to the plastic front piece.

In other systems a continuous metal frame is extruded. In a subsequent process, the excess material in the corners is cut and the corners are bent until they adopt the U shape of these supporting frames.

These solutions use a push-pull cable in their majority and require the supporting frame to include a channel in which the push-pull cable will be guided.

Likewise, all solutions currently known require a subsequent machining of the supporting frame in order to provide all the orifices needed and give it the required outer shape.

In the specific case of solutions extruded and later bent it is necessary to add an additional front piece to act as a weatherboard.

In all known cases, the lateral and front weatherboards are not continuous and must be joined, potentially compromising water tightness.

In addition, it is always necessary to add parts subsequently to close the weatherboards on their rear area and channel the water collected to direct it to the outside.

It is also necessary to use several parts that act as stops for the pivots used in the mechanism.

One object of the invention is a supporting frame for automobile sunroofs that is injectable and is made of a single part, without requiring any subsequent machining, with a specific design adapted to cable traction systems.

Another object of the invention is a supporting frame with a geometry of the lateral sliding element guides designed to allow obtaining it in a mould.

A further object of the invention is a supporting frame that allows to mount the sliding elements in a vertical sense, by virtue of grooves established in parts of the surface of the rear ends of the lateral guides.

To attain these objectives, the supporting frame of the invention is made by injection of either plastic or aluminium alloy, so that the frame will configure the front piece and the lateral sliding element guides. The frame is therefore made of a single piece and is obviously manufactured in a single process, without requiring any subsequent machining, riveting, soldering, gluing etc.

The front part of the frame incorporates a projection adapted to allow attaching the cable actuation motor to it. This projection also acts as a cover for the cable drum connected to the motor.

The frame thus constructed does not require any guide channels, as the traction is provided by a cable that follows a straight line between several rerouting points provided in said frame.

These cable rerouting points are normally located at the corners of the frame. However, in cases where the sunroof has a high curvature or when the cable interferes with other components, it is also possible to establish intermediate reroutings that leave the cable free and following a straight line between all such rerouting points.

The supporting frame made of a single piece obviously does not require any operation to join the front piece to the guides or for the weatherboards, thereby fully ensuring its water tightness.

The sliding elements that run along the sides and that produce the movement of the sunroof are advantageously mounted on said sides in a vertical sense, for which purpose grooves are provided in horizontal segments of the rear ends of the sides.

The supporting frame of the invention can be made of a plastic material or a metal alloy as may be convenient.

In the case that the injected supporting frame is made of a plastic material, the water outlets and drain tubes will be obtained at the same time as the frame itself, together with the stops for the mechanism.

Therefore, in this option no auxiliary parts are needed except for the bushings for attachment to the automobile body and crossbars in cases where they are required.

In the case of an injected supporting frame made from a metal alloy, an undesirable friction may appear between the cable and the frame in the reroutings. To solve this drawback, auxiliary parts are clipped onto the frame in orifices of said frame provided for this purpose. These reroutings can also incorporate the drainage ducts depending on their exact location.

A frame constructed according to the present invention will also provide a significant reduction in the weight of the assembly, greater space for mounting the actuation mechanism for the mobile panel and a greater ease of recycling of the frame as it is made of a single material.

The invention can be seen in greater detail and precision in the accompanying drawings, which represent a practical embodiment of the invention as follows:

Figure 1 shows a perspective view of a frame according to the invention.

Figure 2 shows an enlarged detailed view of one of the front corners of the frame of figure 1.

Figure 3 shows a perspective view of the front part of the frame, seen from below, according to the invention.

Figure 4 shows a detailed view of the end of the sides of the frame, according to the invention.

Figure 5 shows a detail of the bottom of the support frame made of injected plastic according to the invention.

According to figure 1, a support frame (1) can be seen that incorporates some of the elements that constitute the sunroof. Among these elements is the sliding element (3) on one of the sides (A). These sides physically configure the frame together with the front (B).

The support frame is made of a single piece, and includes in this representation the cable (2) as a traction element. The cable arrives from the corresponding drum-motor assembly located under the extrusion (C) of the central part of the front (B).

The four ends (4, 6) of the front (B) and (5, 7) of the sides (A) incorporate the corresponding reroutings of the cable (2). The sides (A) and the front (B) are

provided with orifices (21) for attachment to the body. Figure 1 only shows the orifices of one of the sides for purposes of clarity.

The cable (2) is constituted by three cable segments. The first segment runs from the motor drum to one of the traction sliding elements (3) passing a rerouting channel at the corner (4). The end of this cable joined to the sliding element (3) has a spring that maintains the cable tension within its working range.

Another cable segment runs from the aforementioned sliding element to the rerouting channel at the corner (4). The end of this cable coupled to the sliding element (3) has a spring that maintains the cable tension within its working range.

Another cable segment runs from the aforementioned sliding element to the rerouting channel of the end (5), returning to the corner (4). At this corner it passes another rerouting channel, different from the previously mentioned channel, reaching the other corner (6) at which it passes though the corresponding rerouting until it is attached to a lug in a housing of said second traction sliding element. No springs are mounted at any end of this cable.

The third cable segment starts at the last sliding element with a spring coupled at its start, passes the rerouting of the end (7) of the side towards the front end (6) where another rerouting different from the aforementioned one is joined to the motor drum, closing the circuit.

In figure 2 it is worth noting the corner (6) of one of the fronts with the third cable segment (10) that connects the sliding element to the drum by rerouting the end (7) of the side. This cable (10) passes the rerouting (8) at this side.

The second cable (11) that arrives from the other front corner (4) and runs towards the sliding element passes the rerouting (9) at this corner (6).

Naturally, the front end (4) of the supporting frame is provided with another two reroutings through which the first and second cable segments will pass.

Also worth noting in figure 2 is the drain tube (12) obtained in the injection, perfectly integrated in the supporting frame (1), as well as one of the orifices (21) for attaching it to the body. Through these orifices pass screws that anchor said frame provided with metal inserts in the form of bushings.

Figure 3 shows the bottom face of the extrusion (C), in which the drum cover (14) can be seen to be integrated in the supporting frame, as well as the attachment points (13) for the motor, not shown.

Figure 3 also shows the position of the aforementioned cables (10, 11), where cable (10) passes the position of the drum and cable (11) runs towards the opposite front corner.

The position of the drain tube (12) is also perfectly visible in figure 3.

The metal alloy version shown in figure 4 represents the corner (7) of one of the sides (A) of the supporting frame, with the rerouting (15) for the cable and the drain tube (16).

In this example of embodiment the rerouting and the drain tube form part of an auxiliary piece that is clipped onto the frame by tabs (17) provided in said piece, which fit in orifices made in the frame *ad hoc*. The rerouting may be simple or double, with one or two channels for the cable depending on its position at the corners (4, 6) or the ends (5, 7).

Naturally, as stated above, in the case of a supporting frame made of injected plastic the differentiated auxiliary part will not exist, as it is generated directly in the injection.

Continuing with reference to figure 4, the channels (19) of the supporting frame are shown in which run the sliding element tabs and the mobile lining, as well as the gasket between the lining and the frame of the opening.

Also shown are the orifices (20) laterally provided on the sides of the supporting frame, specifically in the upper horizontal walls of the channels (21), which allow to mount the sliding elements in a vertical sense.

With respect to figure 5, which shows details similar to those of figure 3, the solution of a supporting frame made of plastic is further described in which turrets (18) define reroutings at the ends of the channels in which the cables run, in this case the cables (10, 11) in the corner (6) of the frame.

Other formations with similar turrets (18) are provided in the other corner (4) of the frame, as well as on the ends (5, 7) of the sides (A).